

## CLAIMS

- 1 1. A vehicle navigation system that receives sensor data from a plurality of sensors,  
2 and provides a map image that is presented on a display, said system comprising:  
3 a navigation map data memory that includes map data indicative of roadways  
4 stored in Cornu spiral form; and  
5 a navigation processing unit that receives the sensor data, and requests map data  
6 from said navigation map data memory associated with the sensor data, and computes the  
7 map image from said map data.
- 1 2. The vehicle navigation system of claim 1, wherein said map data includes a data  
2 indicative of a unit Cornu spiral.
- 1 3. The vehicle navigation system of claim 2, wherein said navigation processing unit  
2 computes said map image using Cornu spiral polynomial coefficients stored in said  
3 navigation map data memory.
- 1 4. The vehicle navigation system of claim 2, wherein terms of polynomials of the unit  
2 Cornu spiral are stored in said navigation map data memory and said map image is  
3 computed using said terms of polynomials of the unit Cornu spiral.
- 1 5. The vehicle navigation system of claim 4, wherein said terms of polynomials are  
2 associated with Taylor series expressions indicative of said Cornu spiral.
- 1 6. The vehicle navigation system of claim 5, wherein said Cornu spiral is of the form  
2  $l = Ka^2$ , where  $l$  is indicative of arc length and  $K$  is indicative of curvature.
- 1 7. The vehicle navigation system of claim 5, wherein said navigation map data  
2 memory includes coordinates of the unit Cornu spiral stored in a table, from which all the

3 Cornu spirals of the navigation map are derived.

1 8. The vehicle navigation system of claim 5, wherein said navigation map data  
2 memory includes coordinates of the unit Cornu spiral stored in a table, from which all the  
3 Cornu spirals of the navigation map are derived for roads, railroad lines, rivers, lakes, and  
4 similar cartographic parameters defined as Cornu spirals.

1 9. A vehicle navigation system that receives sensor data from a plurality of sensors,  
2 and provides a map image that is presented on a display, said system comprising:

3 a navigation map data memory that includes map data indicative of roadways  
4 stored in Cornu spiral form; and

5 means for receiving the sensor data, for requesting map data from said navigation  
6 map data memory associated with the sensor data, and for computing the map image from  
7 said map data.

1 10. The vehicle navigation system of claim 9, wherein said map data includes data  
2 indicative of a unit Cornu spiral.

1 11. The vehicle navigation system of claim 10, wherein said navigation processing unit  
2 computes said map image using Cornu spiral polynomial coefficients stored in said  
3 navigation map data memory.

1 12. The vehicle navigation system of claim 11, wherein terms of polynomials of the  
2 unit Cornu spiral are stored in said navigation map data memory and said map image is  
3 computed using said terms of polynomials of the unit Cornu spiral.

1 13. The vehicle navigation system of claim 12, wherein said terms of polynomials are  
2 associated with Taylor series expressions indicative of said Cornu spiral.

1 14. The vehicle navigation system of claim 13, wherein said Cornu spiral is of the form  
2  $l = Ka^2$ , where  $l$  is indicative of arc length and  $K$  is indicative of curvature.

1 15. The vehicle navigation system of claim 13, wherein said navigation map data  
2 memory includes coordinates of the unit Cornu spiral stored in a table, from which all the  
3 Cornu spirals of the navigation map are derived.

1 16. The vehicle navigation system of claim 13, wherein said navigation map data  
2 memory includes coordinates of the unit Cornu spiral stored in a table, from which all the  
3 Cornu spirals of the navigation map are derived for roads, railroad lines, rivers, lakes, and  
4 similar cartographic parameters defined as Cornu spirals.

1 17. A method of computing a map image in a vehicle navigation system that receives  
2 sensor data from a plurality of sensors, comprising:  
3 providing map data indicative of roadways stored in Cornu spiral form in a  
4 navigation map data memory device;  
5 receiving the sensor data, and in response thereto requesting map data from said  
6 navigation map data memory device; and  
7 computing the map image from said map data.